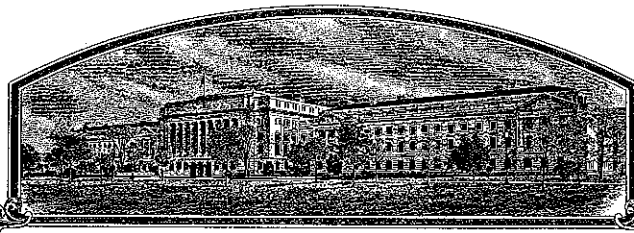


No.

200000196



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Florida Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

RYEGRASS, ANNUAL

'Jumbo'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this sixteenth day of March, in the year two thousand and five.

Attest:


Commissioner
Plant Variety Protection Office
Agricultural Marketing Service


Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Florida Agricultural Experiment Station		FL X1997 (G) 4X LR	Jumbo
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)	FOR OFFICIAL USE ONLY PVPO NUMBER 2000001987 DATE 4/3/00
1022 McCarty Hall P.O. Box 110200 Gainesville, FL 32611-0200		(352) 392-1784	
7. GENUS AND SPECIES NAME		6. FAX (include area code)	FILING AND EXAMINATION FEE \$ 2450.00 DATE 4/3/00
Lolium multiflorum		(352) 392-4965	
8. FAMILY NAME (Botanical)		CERTIFICATION FEE: \$ 432- DATE 9/17/04	
9. CROP KIND NAME (Common name)			
tetraploid annual ryegrass			
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)			
Florida Agricultural Experiment Station			
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS			14. TELEPHONE (include area code)
Gordon M. Prine University of Florida, Agronomy Department 304 NEwell Hall, P.O. Box 110500 Gainesville, FL 32611-0500			(352) 392-1811 ext. 216
			15. FAX (include area code)
			(352) 392-1840
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
<input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership <input checked="" type="checkbox"/> Voucher Sample (2,600 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)			
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)			
<input type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input checked="" type="checkbox"/> NO (If "no," go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?			
<input type="checkbox"/> YES (If "yes," give names of countries and dates) <input checked="" type="checkbox"/> NO			
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.			
Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		SIGNATURE OF APPLICANT (Owner(s))	
Gordon M. Prine		Richard L. Jones	
NAME (Please print or type)		NAME (Please print or type)	
Gordon M. Prine		Richard L. Jones	
CAPACITY OR TITLE		CAPACITY OR TITLE	
Professor & Ryegrass Breeder		Dean of Research	
DATE		DATE	
3/14/00		3/15/00	

200000196

Exhibit A: Origin and Breeding History of Jumbo Annual Ryegrass

Origin: Jumbo is from a doubled, advanced population of Surrey which was developed from Marshall.

Breeding History

Diploid Breeding

Cycle I, 1989-90. Seed of FL X1987 LR select, (2 generations of field selection for crown rust (*Puccinia coronata* (Pers.) and forage and seed yield using Surrey as the base) was planted in all rows of 9,000 plant spaced plant nursery. After roguing crown rust susceptible and off type plants, over 340 plants were selected in a grid over the entire nursery and were harvested for seed for the next generation (Cycle 1 FL). Vegetative portions of about 300 selected plants were sent to Oregon where they were further selected for stem rust (*P. graminis* Pers.) resistance and seed yield by Reed Barker of USDA-ARS National Forage Seed Production Research Center in Corvallis, OR. Seed from the best plants were harvested, composited, thoroughly mixed and returned to Florida (Cycle 1 OR seed).

Cycle II, 1990-91. A 9,000 plant spaced plant nursery was planted in a three row pattern with the two outside rows planted from Cycle I OR seed and middle row from (Cycle 1 FL) seed. Vegetative portions of over 300 plants were selected from OR seed rows in May, 1991 and sent to Oregon for selection in similar manner as 1990 (Cycle II OR seed). Over 400 plants were selected in grid over all rows of Florida nursery. Equal quantities of seed were harvested from all selected plants and composited uniformly (Cycle II FL seed).

Cycle III, 1991-92. Nursery was again seeded in a three row pattern over 9,000 plant nursery with Cycle II OR seed on outside rows and Cycle II FL seed on middle row. Again over 300 plants were selected from Oregon seed rows and sent to Oregon for selection as to stem rust and plant yield (Cycle III OR seed). Seed from over 350 plants were selected, in grid over all rows of Florida nursery (Cycle III FL seed).

Cycle IV, 1992-93. A 9,000 spaced plant nursery was again Florida planted in a 3 row pattern with outside rows being from Cycle III OR seed and middle row from Cycle III FL seed. After roguing diseased plants, 350 plants were selected in a grid over all nursery rows. Equal quantities of seed were harvested per plant and composited by thoroughly mixing seed of all plants. Twenty five grams of this seed, FL X1993 LR select, was sent to Germany for doubling chromosomes in the fall of 1993.

Tetraploid Breeding

The German Seed Company (Deutsche Saalveredelung, DSV) treated some 5,000 seed of FL X1993 LR select with colchicine and identified some 1,000 possible tetraploids. After losing part of these plants to disease and others to lack of doubling when tested by flow cytometer they

200000196

ended up with 344 doubled plants from which they returned seed of each plant to Florida in the fall of 1995.

Cycle I, 1995-96. Equal quantities of FL X1993 (G) 4X LR seed from the 344 plants doubled in Germany were composited and space planted on all rows over a 6,000 plant nursery at Gainesville. Over 400 plants were selected for crown rust resistance and forage and seed yields in a grid, harvested and composited for planting next cycle.

Cycle II, 1996-97. Composited 4X seed from Cycle I were space planted on all rows over the same 6000 plant nursery at Gainesville. Diseased and off type plants were rogued from nursery. At the end of the season, all remaining plants were harvested as FL X1997 (G) 4X LR.

Cycle III, 1997-98. A prebreeder's seed planting of FL X1997 (G) 4X LR was made near Halsey, Oregon. Diseased and poor seed producing seed plants were rogued and the remaining plants were harvested as prebreeders seed.

Cycle IV, 1998-99. A breeder's seed field was planted from prebreeders seed near Halsey, Oregon. After roguing stem-rust susceptible and other diseased plants. The remaining plants were harvested for breeder's seed to plant for Foundation seed of Jumbo.

Exhibit B: Statement of Distinctness

Jumbo is most similar to its diploid parent 'Surrey'.

Jumbo was developed by doubling 344 plants from an advanced population of the diploid cultivar 'Surrey'. Recurrent selection from gridded nurseries, 6,000 to 9,000 spaced plants in size, was used in both diploid and tetraploid selection cycles. The doubling resulted in larger stems, leaves and seed heads, larger seed, and later maturity than the diploid parent. The tetraploid seems to have more disease resistance than the diploid parent, and in crown rust nursery here in Florida had best crown rust resistance among commercial annual ryegrass cultivars tested. Jumbo has shown some resistance to *Helminthosporium* leaf spot and gray leaf spot as well as good stem rust resistance in Oregon. The cultivar has good cold tolerance and should be adapted to all of Southeastern ryegrass belt. This is the first new tetraploid ryegrass cultivar in the USA to be developed from enough doubled plants to recover the adaptation and diversity of the diploid parent population.

7a8
1/25/04

Statement of Uniformity and Stability

I have observed 'Jumbo' for 4 generations past breeder seed and find it both uniform and stable. I know of no variants.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Ryegrass)

OBJECTIVE DESCRIPTION OF CULTIVARS
RYEGRASS
(*Lolium* spp.)

NAME OF APPLICANT(S) Florida Agricultural Experiment Station	VARIETY NAME OR TEMPORARY DESIGNATION Jumbo
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code) 1022 McCarty Hall P.O. Box 110200 Gainesville, FL 32611-0200	FOR OFFICIAL USE ONLY PVPO NUMBER

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in first box (e.g. 089 or 09) when number is either 99 or less or 9 or less. Descriptions of characters should represent those that are typical for the variety. Ranges may be given also. Measured data should be for SPACED PLANTS. Give additional description for all characteristics that cannot be adequately described in the form below. Append all pertinent comparative trial and evaluation data. The symbol "▲" indicates decimal.

1. SPECIES:

<input type="text"/> 1	1 = L. MULTIFLORUM (annual or Italian; includes <i>Westerwoldicum</i>)	2 = L. PERENNE (perennial)	3 = L. RIGIDUM (includes <i>Wimmera</i>)
<input type="text"/> 4	4 = HYBRID (of species) _____		
<input type="text"/> 5	5 = OTHER (Specify) _____		

2. PLOIDY:

<input type="text"/> 2	1 = DIPLOID	2 = TETRAPLOID	3 = OTHER (Specify) _____
------------------------	-------------	----------------	---------------------------

3. DURATION:

<input type="text"/> 1	1 = ANNUAL OR BIENNIAL	2 = SHORT LIVED PERENNIAL (3-4 years)	3 = PERENNIAL (more than 4 years)
------------------------	------------------------	---------------------------------------	-----------------------------------

STANDARD CULTIVARS

1 = GULF	2 = WIMMERA 62	3 = LINN	4 = PELO	9 = Surrey
5 = NORLEA	6 = ABERYSTWYTH S-23	7 = MANHATTAN	8 = PENNFINE	

4. MATURITY (50% HEADED) Use standards from above for comparison: 1998-99 Rust Nursery (90% headed)

<input type="text"/> 5	1 = VERY EARLY	3 = EARLY	<input type="text"/> 0 <input type="text"/> 5	DAYS XXXXXX THAN 9 STANDARD CULTIVAR
<input type="text"/> 5	5 = MEDIUM	7 = LATE	<input type="text"/> 0 <input type="text"/> 6	DAYS LATER THAN 1 STANDARD CULTIVAR
<input type="text"/> 9	9 = VERY LATE			

* See Comments

5. MATURE PLANT HEIGHT (Use standard cultivars from above):

<input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 5	CM. HIGH	<input type="text"/> <input type="text"/> <input type="text"/>	CM. SHORTER THAN <input type="text"/> STANDARD CULTIVAR
<input type="text"/> 0 <input type="text"/> 3 <input type="text"/> 4	CM. TALLER THAN <input type="text"/> 1	STANDARD CULTIVAR	

6. PERCENT WINTER DAMAGE (estimated as percent of the area appearing dead). Use standard cultivars from above for comparison:

<input type="text"/> <input type="text"/> N <input type="text"/> A	PERCENT DAMAGE OF APPLICATION CULTIVAR
<input type="text"/> <input type="text"/> N <input type="text"/> A	PERCENT DAMAGE OF <input type="text"/> STANDARD CULTIVAR

7. TURF DENSITY Use standard cultivars from above: Not turf cultivar

<input type="text"/> <input type="text"/> N <input type="text"/> A	TILLERS PER 100 SQ. CM.
<input type="text"/> <input type="text"/> N <input type="text"/> A	LESS TILLERS PER 100 SQ. CM. THAN <input type="text"/> STANDARD CULTIVAR
<input type="text"/> <input type="text"/> N <input type="text"/> A	MORE TILLERS PER 100 SQ. CM. THAN ... <input type="text"/> STANDARD CULTIVAR

8. FLAG LEAF (at full growth) Use standard cultivars from above:

<input type="text"/> 2 <input type="text"/> 1 <input type="text"/> 3	CM. LENGTH (from ligule to tip)	<input type="text"/> 0 <input type="text"/> 9 <input type="text"/> 4	MM. WIDTH (at widest point)
<input type="text"/> <input type="text"/> <input type="text"/>	CM. SHORTER THAN <input type="text"/> STANDARD CULTIVAR	<input type="text"/> 7	FLAG LEAF AT BOOT STAGE:
<input type="text"/> 0 <input type="text"/> 4 <input type="text"/> 5	CM. LONGER THAN <input type="text"/> 1 STANDARD CULTIVAR		1 = DEFLEXED
<input type="text"/> <input type="text"/> <input type="text"/>	MM. NARROWER THAN <input type="text"/> STANDARD CULTIVAR		3 = RECURVED
<input type="text"/> 3 <input type="text"/> 9	MM. WIDER THAN <input type="text"/> 1 STANDARD CULTIVAR		5 = HORIZONTAL
			7 = SEMI-ERECT
			9 = ERECT

1 = GULF
5 = NORLEA

2 = WIMMERA 62
6 = ABERYSTWYTH S-23

STANDARD CULTIVARS
3 = LINN
7 = MANHATTAN

4 = PELO
8 = PENNFINE
9 = Surrey

9. LEAVES:

1 VERNATION: 1 = LEAVES ROLLED IN YOUNG SHOOTS
2 = LEAVES SEMI-ROLLED (folded with rolled edges)
3 = LEAVES FOLDED IN YOUNG SHOOTS

0 0 0 % PLANTS WITH ANTHOCYANIN IN LOWER LEAF SHEATH

3 FOLIAGE COLOR: 1 = YELLOW GREEN
2 = MEDIUM GREEN
3 = BLUE GREEN

2000000196

10. SPIKE:

6 7 5 MM. SPIKE LENGTH (tip to internode below lowest floret)

3 7 MM. SHORTER THAN 1

7 5 MM. LONGER THAN 9

USE STANDARD CULTIVARS FROM ABOVE

1 3 grams
MG. PER TEN SPIKES (trimmed to internode below lowest floret)

MG. LIGHTER PER TEN SPIKES THAN

USE STANDARD CULTIVARS FROM ABOVE

2 0 grams
MG. HEAVIER PER TEN SPIKES THAN 1

9 5 FLORETS PER SPIKELET

PERCENTAGE OF PLANTS WITH:

RACHIS: 1 0 0 % SMOOTH

0 0 0 % ROUGH

SPIKE COLOR: 1 0 0 % GREEN

0 0 0 % PURPLE

LEMMA: 0 9 2 % AWNED

0 2 9 MM. AWN LENGTH

9 2 MM. GLUME LENGTH

2 1 = SPIKELET LENGTH NEARLY EQUAL TO OUTER GLUMES
2 = SPIKELET LENGTH MUCH LONGER THAN OUTER GLUMES

11. COLEOPTILE:

1 0 0 % PLANTS WITH ANTHOCYANIN IN COLEOPTILE

12. ANTHOR COLOR:

0 0 0 % PLANTS WITH WHITE ANTHERS

1 0 0 % PLANTS WITH YELLOW ANTHERS

0 0 0 % PLANTS WITH PURPLE ANTHERS

13. ROOT AND PLANT CHARACTERS:

0 0 0 % PLANTS WITH PROSTRATE GROWTH HABIT

1 0 0 % PLANTS WITH FLUORESCENT ROOTS

1 0 0 % PLANTS WITH UPRIGHT GROWTH HABIT

14. SEED:

4 3 0 0 MG. PER 1,000 SEED

6 6 8 MM. TOTAL LENGTH OF 10 SEEDS

1 8 3 MM. TOTAL WIDTH OF TEN SEEDS

15. DISEASE (0 = NOT TESTED, 2 = HIGHLY SUSCEPTIBLE, 4 = MODERATELY SUSCEPTIBLE, 6 = MODERATELY RESISTANT, 8 = HIGHLY RESISTANT):

<input type="text" value="8"/> CROWN RUST (<u>Puccinia coronata</u>)	<input type="text" value="0"/> DOLLAR SPOT (<u>Sclerotinia</u>)	<input type="text" value="0"/> BROWN PATCH (<u>Rhizoctonia</u>)
<input type="text" value="4"/> LEAF SPOT (<u>Helminthosporium</u>)	<input type="text" value="0"/> MILDEW	<input type="text" value="6"/> OTHER (<u>Specify</u>)
<input type="text" value="0"/> SNOW MOLD (<u>Typhula</u>)	<input type="text" value="0"/> RED THREAD (<u>Corticium</u>)	stem rust (<u>P. graminis</u>)
		[4] gray leaf spot (<u>Pyricularia</u>)

16. INSECT (0 = NOT TESTED, 2 = HIGHLY SUSCEPTIBLE, 4 = MODERATELY SUSCEPTIBLE, 6 = MODERATELY RESISTANT, 8 = HIGHLY RESISTANT):

(Specify) _____

17. GIVE RESEMBLANCE VALUE IN LEFT COLUMN AND VARIETY CODE NUMBER IN RIGHT COLUMN FOR VARIETY WITH WHICH COMPARISON IS MADE (1 = LESS THAN, 2 = SAME AS, 3 = MORE ERECT, MORE RESISTANT, DENSER, MORE PERSISTENT, DARKER OR GREATER HEIGHT.):

0=not tested (not turf)

RESEMBLANCE	CHARACTER	SIMILAR VARIETY
<input type="text" value="2"/>	PLANT HABIT (erectness)	<input type="text" value="1"/> 1 = GULF
<input type="text" value="1"/>	TILLERING	<input type="text" value="1"/> 2 = WIMMERA 62
<input type="text" value="2"/>	WINTER HARDINESS	<input type="text" value="9"/> 3 = LINN
<input type="text" value="2"/>	HIGH TEMP. STRESS RESISTANCE	<input type="text" value="9"/> 4 = PELO
<input type="text" value="0"/>	TURF PERSISTENCE	<input type="text" value="0"/> 5 = NORLEA
<input type="text" value="2"/>	PLANT COLOR	<input type="text" value="9"/> 6 = ABERYSTWYTH S-23
<input type="text" value="0"/>	VERTICAL SEEDLING GROWTH RATE	<input type="text" value="0"/> 7 = MANHATTAN
<input type="text" value="0"/>	CROWN DENSITY	<input type="text" value="0"/> 8 = PENNFINE
<input type="text" value="0"/>	MOWER SHREDDING RESISTANCE	<input type="text" value="0"/> 9=Surrey

18. GIVE AREA OF ADAPTATION AND INTENDED USE: Southeast annual ryegrass belt for forage

19. GIVE AREA TEST RESULTS PRESENTED FROM: Given in proposed circular (attached) **Exhibit D**

COMMENTS:

We made plant measurements on Jumbo, Surrey and Registered Gulf at two locations, the Agronomy Forage Research Unit (AFRU) and Green Acres (GA) farm in 1997-98 season. The two locations are approximately 10 miles apart and had different soil series, Arredondo fine sand at Green Acres and Scranton fine sand at AFRU. The plantings at AFRU was at normal time and at GA was one week later to help facilitate making plant measurements. We space planted in 3 feet rows using multiple seeds with a jab planter and thinned to one plant per hill. We measured 100 plants of each entry replicated twice at each location. We irrigated both areas during drought, more at GA which had most droughty soil. We are reporting the results of AFRU on exhibit form C. This planting had most normal growth of the two locations. We are attaching in an envelope, the data for both plantings and enclosing a computer disc with all data and statistical analyses for both locations. Cultivars were so different at the two locations that we did not combine data.

* Flowering data graphs for Jumbo, Gulf and Surrey for both locations included in data envelope for exhibit C.

Exhibit C
Attachment
Jumbo

PVP JUMBO FORAGE RESEARCH UNIT

200000196

ENTRY=JUMBO

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	125.1cm	12.7	84.5	156.8
FLAG LEAF LENGTH	8	200	21.3cm	4.8	9.0	34.0
FLAG LEAF WIDTH	8	200	9.4mm	1.9	4.0	14.0
SPIKE LENGTH	10	200	674.8mm	115.8	406.0	988.0
SPIKE WEIGHT	10	200	13.0g/10spk	0.1	1.1	1.6
FLORETS/SPIKELET	10	120	9.5	1.8	5.0	14.0
AWN LENGTH	10	200	2.9mm	1.7	0.0	8.0
GLUME LENGTH	10	200	9.2mm	1.8	5.0	14.0
SEED WEIGHT	14	20	4300.0mg/1000	300.0	3900.0	4900.0
SEED WIDTH	14	20	18.3mm/10	1.0	17.0	19.0
SEED LENGTH	14	20	66.4mm/10	3.4	63.0	69.0
DISEASE RATING	15	200	5.0	1.8	1.0	9.0

ENTRY=GULF

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	121.6cm	11.0	88.2	157.5
FLAG LEAF LENGTH	8	200	16.8cm	4.4	8.4	28.9
FLAG LEAF WIDTH	8	200	5.5mm	1.2	3.0	9.0
SPIKE LENGTH	10	200	702.4mm	136.6	301.0	943.0
SPIKE WEIGHT	10	200	11.0g/10spk	0.1	0.8	1.3
DISEASE RATING	15	200	6.8	1.4	3.0	10.0

ENTRY=SURREY

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	117.5cm	11.7	71.1	151.9
FLAG LEAF LENGTH	8	200	17.5cm	4.1	8.5	27.5
FLAG LEAF WIDTH	8	200	5.9mm	1.3	4.0	9.0
SPIKE LENGTH	10	200	600.1mm	133.5	325.0	940.0
SPIKE WEIGHT	10	200	10.0g/10spk	0.1	0.8	1.4
DISEASE RATING	15	200	4.4	2.0	1.0	9.0

①

PVP JUMBO FORAGE RESEARCH UNIT

200000196

General Linear Models Procedure
Class Level Information

Class	Levels	Values
ENTRY	3	GULF JUMBO SURREY
REP	2	1 2

Number of observations in data set = 600

PVP JUMBO FORAGE RESEARCH UNIT

General Linear Models Procedure

Dependent Variable: PLANT HEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	6744.86498992	2248.28832997	16.16	0.0001
Error	596	82896.50002256	139.08808729		
Corrected Total	599	89641.36501248			
	R-Square	C.V.	Root MSE	MPHT Mean	
	0.075243	9.711890	11.79356126	121.43425000	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	5776.00706725	2888.00353362	20.76	0.0001
REP	1	968.85792267	968.85792267	6.97	0.0085
Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	5776.00706725	2888.00353362	20.76	0.0001
REP	1	968.85792267	968.85792267	6.97	0.0085

(2)

General Linear Models Procedure

200000196

Dependent Variable: FLAG LEAF LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2633.89346667	877.96448889	45.28	0.0001
Error	596	11557.26813333	19.39138949		
Corrected Total	599	14191.16160000			
	R-Square	C.V.	Root MSE	FLLCM Mean	
	0.185601	23.74914	4.40356554	18.54200000	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	2338.77240000	1169.38620000	60.30	0.0001
REP	1	295.12106667	295.12106667	15.22	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	2338.77240000	1169.38620000	60.30	0.0001
REP	1	295.12106667	295.12106667	15.22	0.0001

③

General Linear Models Procedure

Dependent Variable: FLAG LEAF WIDTH

200000196

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1878.17666667	626.05888889	282.61	0.0001
Error	596	1320.32333333	2.21530761		
Corrected Total	599	3198.50000000			
R-Square		C.V.	Root MSE	FLW Mean	
0.587205		21.41570	1.48839095	6.95000000	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	1855.75000000	927.87500000	418.85	0.0001
REP	1	22.42666667	22.42666667	10.12	0.0015
Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	1855.75000000	927.87500000	418.85	0.0001
REP	1	22.42666667	22.42666667	10.12	0.0015

General Linear Models Procedure

200000196

Dependent Variable: SPIKE LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1769414.03833335	589804.67944445	37.89	0.0001
Error	596	9276923.91999999	15565.30859060		
Corrected Total	599	11046337.95833330			
R-Square		C.V.	Root MSE	SPL Mean	
0.160181		18.92923	124.76100589	659.09166667	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	1121349.10333333	560674.55166667	36.02	0.0001
REP	1	648064.93500000	648064.93500000	41.64	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	1121349.10333333	560674.55166667	36.02	0.0001
REP	1	648064.93500000	648064.93500000	41.64	0.0001

General Linear Models Procedure

Dependent Variable: SPIKE WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	11.10644713	3.70214904	282.31	0.0001
Error	596	7.81584876	0.01311384		
Corrected Total	599	18.92229588			
R-Square		C.V.	Root MSE	SPKWT Mean	
0.586950		9.897741	0.11451568	11.5698807	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	10.60786110	5.30393055	404.45	0.0001
REP	1	0.49858603	0.49858603	38.02	0.0001

(5)

2000000198

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	10.60786110	5.30393055	404.45	0.0001
REP	1	0.49858603	0.49858603	38.02	0.0001

General Linear Models Procedure

Dependent Variable: DISEASE RATING

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	650.33000000	216.77666667	70.17	0.0001
Error	596	1841.16333333	3.08920022		
Corrected Total	599	2491.49333333			

R-Square	C.V.	Root MSE	DISEASE Mean
0.261020	32.46820	1.75761208	5.41333333

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	632.30333333	316.15166667	102.34	0.0001
REP	1	18.02666667	18.02666667	5.84	0.0160

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	632.30333333	316.15166667	102.34	0.0001
REP	1	18.02666667	18.02666667	5.84	0.0160

6

PVP JUMBO FORAGE RESEARCH UNIT

200000196

General Linear Models Procedure

T tests (LSD) for variable: PLANT HEIGHT - 0 0 0 0

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 139.0881

Critical Value of T= 1.96

Least Significant Difference= 2.3162

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	125.142	200	JUMBO
B	121.612	200	GULF
C	117.549	200	SURREY

PVP JUMBO FORAGE RESEARCH UNIT

General Linear Models Procedure

T tests (LSD) for variable: FLAG LEAF LENGTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 19.39139

Critical Value of T= 1.96

Least Significant Difference= 0.8648

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	21.3110	200	JUMBO
B	17.4680	200	SURREY
B			
B	16.8470	200	GULF

7

PVP JUMBO FORAGE RESEARCH UNIT

200000196

General Linear Models Procedure

T tests (LSD) for variable: FLAG LEAF WIDTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 2.215308

Critical Value of T= 1.96

Least Significant Difference= 0.2923

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	9.4250	200	JUMBO
B	5.9250	200	SURREY
C	5.5000	200	GULF

PVP JUMBO FORAGE RESEARCH UNIT

General Linear Models Procedure

T tests (LSD) for variable: SPIKE LENGTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 15565.31

Critical Value of T= 1.96

Least Significant Difference= 24.502

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	702.39	200	GULF
B	674.83	200	JUMBO
C	600.06	200	SURREY

PVP JUMBO FORAGE RESEARCH UNIT

200000196

General Linear Models Procedure

T tests (LSD) for variable: SPIKE WEIGHT

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 0.013114

Critical Value of T= 1.96

Least Significant Difference= 0.0225

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	13.4062	200	JUMBO
B	11.0024	200	GULF
C	10.3011	200	SURREY

PVP JUMBO FORAGE RESEARCH UNIT

General Linear Models Procedure

T tests (LSD) for variable: DISEASE RATING

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 3.0892

Critical Value of T= 1.96

Least Significant Difference= 0.3452

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	6.8150	200	GULF
B	5.0400	200	JUMBO
C	4.3850	200	SURREY

Exhibit C
Attachment
Jumbo

PVP JUMBO GREEN ACRES

200000196

ENTRY=JUMBO

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	73.2cm	12.8	45.3	101.2
FLAG LEAF LENGTH	8	200	11.4cm	3.4	3.8	20.4
FLAG LEAF WIDTH	8	200	6.8mm	1.4	4.0	11.0
SPIKE LENGTH	10	200	481.5mm	82.8	275.0	717.0
SPIKE WEIGHT	10	200	11.0g/10spk	1.0	8.0	14.0
FLORETS/SPIKELET	10	120	8.8	1.6	5.0	13.0
AWN LENGTH	10	200	2.0mm	1.3	0.0	5.0
GLUME LENGTH	10	200	9.0mm	1.5	5.0	12.0
SEED WEIGHT	14	20	3600.0mg/1000	400.0	3100.0	4200.0
SEED WIDTH	14	20	17.1mm/10	1.17	16.0	19.0
SEED LENGTH	14	20	62.0mm/10	2.89	59.0	68.0
DISEASE RATING	15	200	5.4	1.8	2.0	9.0

ENTRY=GULF

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	75.8cm	11.7	44.1	111.5
FLAG LEAF LENGTH	8	200	10.9cm	3.3	4.9	22.4
FLAG LEAF WIDTH	8	200	5.1mm	1.2	2.0	9.0
SPIKE LENGTH	10	200	514.7mm	81.5	291.0	781.0
SPIKE WEIGHT	10	200	8.0g/10spk	1.0	6.0	11.0
DISEASE RATING	15	200	7.5	1.2	4.0	10.0

ENTRY=SURREY

Variable	CAT#	N	Mean	Std Dev	Minimum	Maximum
PLANT HEIGHT	5	200	69.4cm	12.3	26.5	98.7
FLAG LEAF LENGTH	8	200	11.6cm	3.1	4.2	19.2
FLAG LEAF WIDTH	8	200	5.3mm	1.1	3.0	8.0
SPIKE LENGTH	10	200	450.8mm	81.9	195.0	670.0
SPIKE WEIGHT	10	200	8.0g/10spk	0.1	0.6	1.0
DISEASE RATING	15	200	5.7	1.8	2.0	10.0

10

200000196

PVP JUMBO GREEN ACRES

General Linear Models Procedure
Class Level Information

Class	Levels	Values
ENTRY	3	GULF JUMBO SURREY
REP	2	1 2

Number of observations in data set = 600

PVP JUMBO GREEN ACRES

General Linear Models Procedure

Dependent Variable: PLANT HEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	5378.23179658	1792.74393219	12.04	0.0001
Error	596	88721.30841525	148.86125573		
Corrected Total	599	94099.54021183			
	R-Square	C.V.	Root MSE	MPHT Mean	
	0.057155	16.75377	12.20087111	72.82461667	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	4187.48585908	2093.74292954	14.07	0.0001
REP	1	1190.74593750	1190.74593750	8.00	0.0048

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	4187.48585908	2093.74292954	14.07	0.0001
REP	1	1190.74593750	1190.74593750	8.00	0.0048

PVP JUMBO GREEN ACRES

General Linear Models Procedure

200000196

Dependent Variable: FLAG LEAF LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	85.30228333	28.43409444	2.69	0.0457
Error	596	6306.38570000	10.58118406		
Corrected Total	599	6391.68798333			
R-Square		C.V.	Root MSE	FLLCM Mean	
0.013346		28.84563	3.25287320	11.27683333	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	51.17293333	25.58646667	2.42	0.0900
REP	1	34.12935000	34.12935000	3.23	0.0730

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	51.17293333	25.58646667	2.42	0.0900
REP	1	34.12935000	34.12935000	3.23	0.0730

PVP JUMBO GREEN ACRES

General Linear Models Procedure

Dependent Variable: FLAG LEAF WIDTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	369.37000000	123.12333333	77.82	0.0001
Error	596	943.02333333	1.58225391		
Corrected Total	599	1312.39333333			
R-Square		C.V.	Root MSE	FLW Mean	
0.281448		21.92696	1.25787675	5.73666667	

(12)

19

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	354.64333333	177.32166667	112.07	0.0001
REP	1	14.72666667	14.72666667	9.31	0.0024

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	354.64333333	177.32166667	112.07	0.0001
REP	1	14.72666667	14.72666667	9.31	0.0024

PVP JUMBO GREEN ACRES

General Linear Models Procedure

Dependent Variable: SPIKE LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	446892.21666668	148964.07222223	22.30	0.0001
Error	596	3981516.42333333	6680.39668345		
Corrected Total	599	4428408.64000000			

R-Square	C.V.	Root MSE	SPL Mean
0.100915	16.94524	81.73369369	482.34000000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	408139.41000000	204069.70500000	30.55	0.0001
REP	1	38752.80666667	38752.80666667	5.80	0.0163

Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	408139.41000000	204069.70500000	30.55	0.0001
REP	1	38752.80666667	38752.80666667	5.80	0.0163

PVP JUMBO GREEN ACRES

General Linear Models Procedure

Dependent Variable: SPIKE WEIGHT

200000196

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	9.93859463	3.31286488	458.08	0.0001
Error	596	4.31027747	0.00723201		
Corrected Total	599	14.24887211			
	R-Square	C.V.	Root MSE	SPWT Mean	
	0.697500	9.548668	0.08504122	8.9060822	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	9.90441231	4.95220615	684.76	0.0001
REP	1	0.03418233	0.03418233	4.73	0.0301
Source	DF	Type III SS	Mean Square	F Value	Pr > F
ENTRY	2	9.90441231	4.95220615	684.76	0.0001
REP	1	0.03418233	0.03418233	4.73	0.0301

PVP JUMBO GREEN ACRES

General Linear Models Procedure

Dependent Variable: DISEASE RATING

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	546.20166667	182.06722222	70.94	0.0001
Error	596	1529.58333333	2.56641499		
Corrected Total	599	2075.78500000			
	R-Square	C.V.	Root MSE	Disease Mea	
	0.263130	25.81794	1.60200343	6.20500000	

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ENTRY	2	528.52000000	264.26000000	102.97	0.0001
REP	1	17.68166667	17.68166667	6.89	0.0089
Source	DF	Type III SS	Mean Square	F Value	Pr > F

(14)

21

ENTRY	2	528.52000000	264.26000000	102.97	0.0001
REP	1	17.68166667	17.68166667	6.89	0.0089

200000196

PVP JUMBO GREEN ACRES

General Linear Models Procedure

T tests (LSD) for variable: PLANT HEIGHT

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 148.8613
Critical Value of T= 1.96
Least Significant Difference= 2.3962

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	75.841	200	GULF
B	73.226	200	JUMBO
C	69.407	200	SURREY

PVP JUMBO GREEN ACRES

General Linear Models Procedure

T tests (LSD) for variable: FLAG LEAF LENGTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 10.58118
Critical Value of T= 1.96
Least Significant Difference= 0.6388

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	11.5705	200	SURREY
A			
B	11.3815	200	JUMBO
B			
B	10.8785	200	GULF

(15)

200000196

PVP JUMBO GREEN ACRES

General Linear Models Procedure

T tests (LSD) for variable: FLAG LEAF WIDTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 1.582254

Critical Value of T= 1.96

Least Significant Difference= 0.247

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	6.8200	200	JUMBO
B	5.2750	200	SURREY
B			
B	5.1150	200	GULF

PVP JUMBO GREEN ACRES

General Linear Models Procedure

T tests (LSD) for variable: SPIKE LENGTH

NOTE: This test controls the type I comparisonwise error rate not the experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 6680.397

Critical Value of T= 1.96

Least Significant Difference= 16.052

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	514.685	200	GULF
B	481.520	200	JUMBO
C	450.815	200	SURREY

(16)

PVP JUMBO GREEN ACRES

200000196

General Linear Models Procedure

T tests (LSD) for variable: SPIKE WEIGHT

NOTE: This test controls the type I comparisonwise error rate not the
experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 0.007232

Critical Value of T= 1.96

Least Significant Difference= 0.0167

Means with the same letter are not significantly different.

T Grouping	Mean	N	ENTRY
A	10.70773	200	JUMBO
B	8.20936	200	GULF
C	7.80115	200	SURREY

PVP JUMBO GREEN ACRES

General Linear Models Procedure

T tests (LSD) for variable: DISEASE RATING

NOTE: This test controls the type I comparisonwise error rate not the
experimentwise error rate.

Alpha= 0.05 df= 596 MSE= 2.566415

Critical Value of T= 1.96

Least Significant Difference= 0.3146

Means with the same letter are not significantly different.

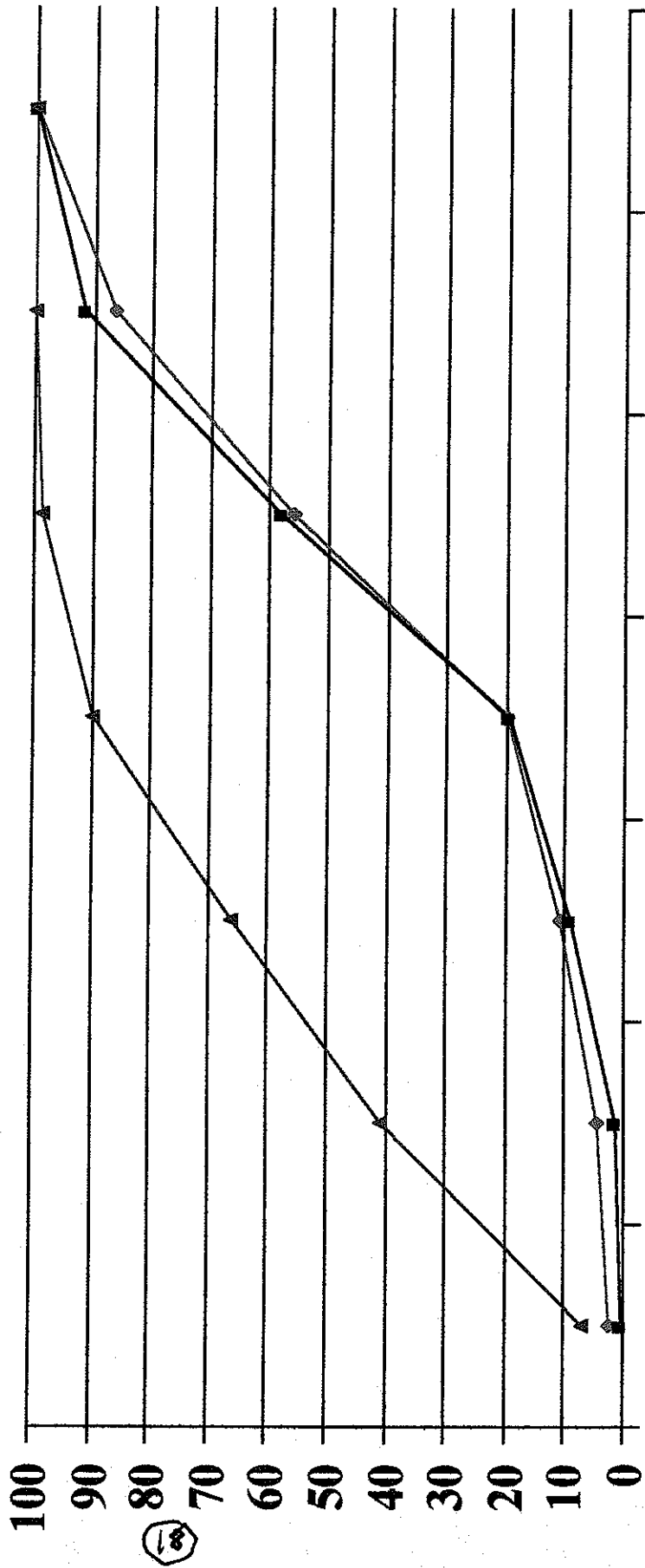
T Grouping	Mean	N	ENTRY
A	7.5150	200	GULF
B	5.7350	200	SURREY
C	5.3650	200	JUMBO

19

Annual Ryegrass Maturity at Forage Research Unit

◆ Surrey ■ Jumbo ▲ Gulf

%Flowering



200000196

17-Apr 21-Apr 25-Apr 29-Apr 3-May 7-May 11-May

Annual Ryegrass Maturity at Green Acres

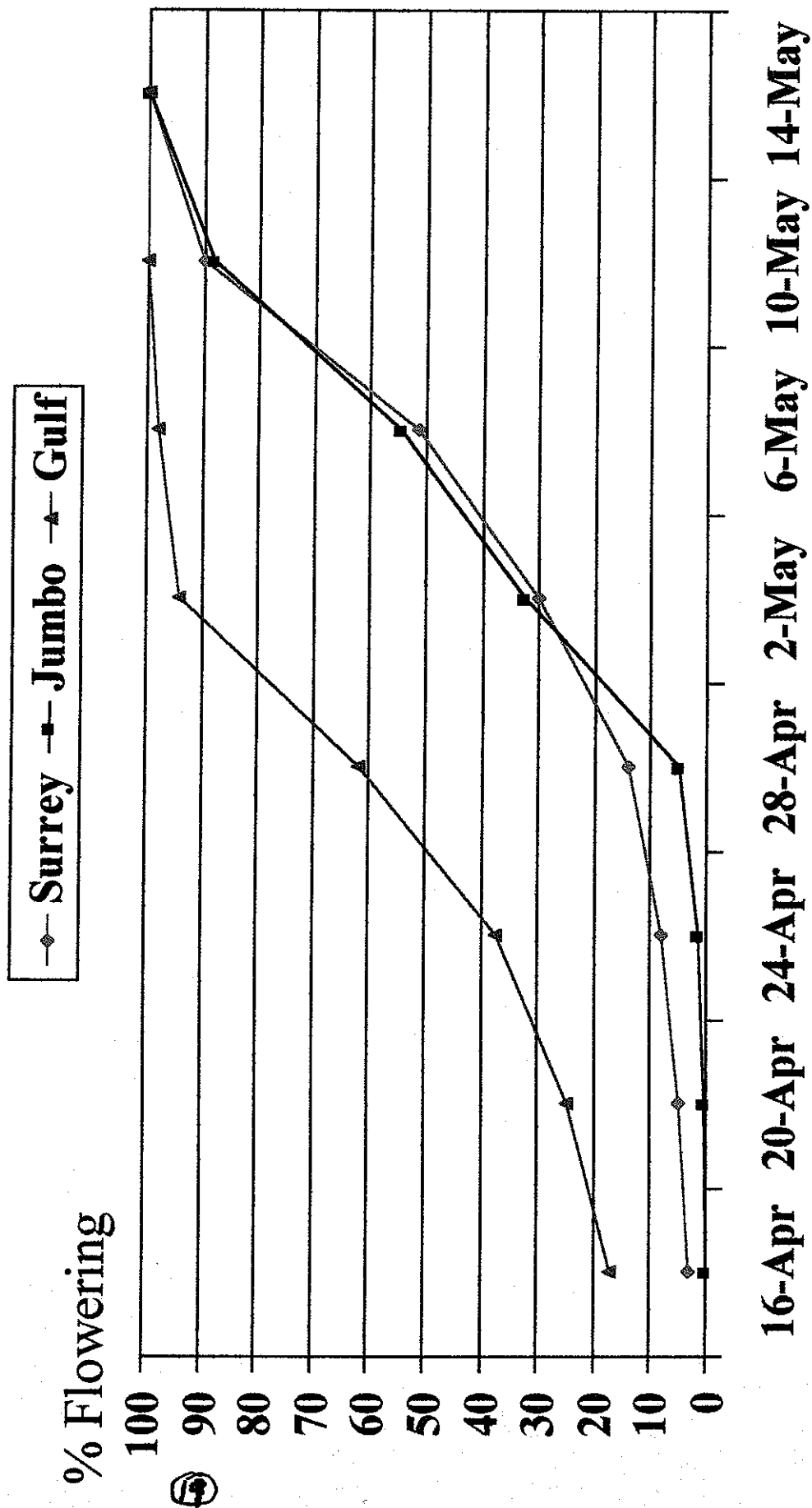


Exhibit D: Additional Description of Variety.**Proposed release circular of Jumbo with Tables on dry matter yield and disease resistance.****Jumbo, a Tetraploid Annual Ryegrass****G. M. Prine, L. S. Dunavin, P. Mislevy, R. L. Stanley and A. R. Blount**

Dr. G. M. Prine is a Professor and Ryegrass Breeder, Agronomy Department, University of Florida, Gainesville. Dr. L. S. Dunavin is Associate Professor of Agronomy, West Florida Research and Education Center at Jay. Dr. P. Mislevy is a Professor of Agronomy, Range Cattle Research and Education Center at Ona. Dr. R. L. Stanley is an Associate Professor of Agronomy and Dr. A. R. Blount is an Assistant Professor, Agronomy Department, North Florida Research and Education Center at Quincy.

Introduction

Jumbo was developed to provide a tetraploid annual ryegrass (*Lolium multiflorum* L.) adapted to Florida and the annual ryegrass growing area of Southeast. Annual ryegrass produces high yields of quality forage and is less expensive to establish when compared with other cool season annual grasses. At the present time annual ryegrass is grown as a forage either alone or mixtures on several hundred thousand acres of Florida farm land with additional thousands of acres of non-farm land. Ryegrass should be planted more extensively.

The long time available ryegrass cultivars, Florida Rust Resistant, Florida 80 and Surrey are diploid. Jumbo was developed by doubling the chromosome number in an elite advanced population derived from Surrey. This process greatly increased the size of the various plant parts, hence the name Jumbo. The tetraploid has larger plant cells, leading to larger leaves, stems and seed. Jumbo has later maturity than Surrey. It should be adapted to the same areas and forage uses as the diploids. Besides having high forage and seed yields, Jumbo has superior crown rust (*Puccinia coronata* (Pers.) Cda.) resistance, and good resistance to other common ryegrass diseases. Because of its larger plant parts, Jumbo may not replace the smaller diploid ryegrasses for use on parkland, play grounds, lawns and highway right-of-ways.

Crown rust is the most serious disease of ryegrass and in some years results in sizeable losses of late season forage and seed yield. This disease normally begins early in the winter in south Florida and south Texas and spreads northward as the season progresses. Usually, the earlier that crown rust begins in a season, the greater the damage and the larger the area of the ryegrass belt which will be infected. The rust epiphytotic is probably spread northward faster by rust-susceptible ryegrass growing on non-pasture land than by ryegrass which is grazed. Grazing often removes rust infected leaves before they reach the spore-forming stage. It is particularly important that late-maturing ryegrasses such as Jumbo have crown rust-resistance because they are subjected to high populations of crown rust spores for a longer period of time than is early maturing ryegrass. The late-maturing, diploid ryegrass cultivars 'Marshall' and 'Passerel' have been grown widely in Florida and the Southeast, but are highly susceptible to crown rust. Surrey diploid ryegrass complimented the early-maturing, crown rust-resistant 'Florida 80' ryegrass to give growers a choice of diploid annual rust-resistant ryegrasses with varying maturities. Now Jumbo gives a choice of a late-maturing tetraploid crown rust resistant ryegrass. It is particularly important that southern portions of the ryegrass belt be planted to crown rust-resistant ryegrasses to reduce rust spread over the entire Southeastern ryegrass belt.

Breeding Procedures

Diploid Breeding

Cycle I, 1989-90. Seed of FL X1987 LR select, (2 generations of field selection for crown rust and forage and seed yield using Surrey as the base) was planted in all rows of 9,000 plant spaced plant nursery. After roguing crown rust susceptible and off type plants, over 340 plants were selected in a grid over the entire nursery and were harvested for seed for the next generation (Cycle 1 FL). Vegetative portions of about 300 selected plants were sent to Oregon where they were further selected for stem rust (*P. graminis Pers.*) resistance and seed yield by Reed Barker of USDA-ARS National Forage Seed Production Research Center in Corvallis, OR. Seed from the best plants were harvested, composited, thoroughly mixed and returned to Florida (Cycle 1 OR seed).

Cycle II, 1990-91. A 9,000 plant spaced plant nursery was planted in a three row pattern with the two outside rows planted from Cycle I OR seed and middle row from (Cycle 1 FL) seed. Vegetative portions of over 300 plants were selected from OR seed rows in May, 1991 and sent to Oregon for selection in similar manner as 1990 (Cycle II OR seed). Over 400 plants were selected in grid over all rows of Florida nursery. Equal quantities of seed were harvested from all selected plants and composited uniformly (Cycle II FL seed).

Cycle III, 1991-92. Nursery was again seeded in a three row pattern over 9,000 plant nursery with Cycle II OR seed on outside rows and Cycle II FL seed on middle row. Again over 300 plants were selected from Oregon seed rows and sent to Oregon for selection as to stem rust and plant yield (Cycle III OR seed). Seed from over 350 plants were selected, in grid over all rows of Florida nursery (Cycle III FL seed).

Cycle IV, 1992-93. A 9,000 spaced plant nursery was again Florida planted in a 3 row pattern with outside rows being from Cycle III OR seed and middle row from Cycle III FL seed. After roguing diseased plants, 350 plants were selected in a grid over all nursery rows. Equal quantities of seed were harvested per plant and composted by thoroughly mixing seed of all plants. Twenty five grams of this seed, FL X1993 LR select, was sent to Germany for doubling chromosomes in the fall of 1993.

Tetraploid Breeding

The German Seed Company treated some 5,000 seed with colchicine and identified some 1,000 possible tetraploids. After losing part of these plants to disease and others to lack of doubling when tested by flow cytometer they ended up with 344 doubled plants from which they returned seed of each plant to Florida in the fall of 1995.

Cycle I, 1995-96. Equal quantities of FL X1993 (G) 4X LR seed from the 344 plants doubled in Germany were composited and space planted on all rows over a 6000 plant nursery at

Gainesville. Over 400 plants were selected for crown rust resistance and forage and seed yields in a grid, harvested and composited for planting next cycle.

Cycle II, 1996-97. Compositated 4X seed from Cycle I were space planted on all rows over the same 6000 plant nursery. Diseased and off type plants were rogued from nursery. At the end of the season, all remaining plants were harvested as FL X1997 (G) 4X LR.

Cycle III, 1997-98. A prebreeder's seed planting of FL X1997 (G) 4X LR was made near Halsey, Oregon. Diseased and poor seed producing seed plants were rogued and remaining plants were harvested as prebreeders seed.

Cycle IV, 1998-99. A breeder's seed field was planted from prebreeders seed near Halsey, Oregon. After roguing stem-rust susceptible and other diseased plants. The remaining plants were harvested for seed to plant for Foundation seed of Jumbo .

Forage Production and Management

Jumbo compared favorably with commercially available annual ryegrass cultivars in forage trials in a number of diverse southeastern locations (Table 1). In general, the yields of Jumbo were equal to or exceeded those of other competitive ryegrass cultivars. This indicates that the high forage yield of Surrey has been retained in the development of Jumbo . Surrey grows well in north portions of the ryegrass belt, hopefully Jumbo will exhibit similar cold tolerance. Most observations indicate that Jumbo is slightly later (5-7 days) in maturity than Surrey and 1 to 2 weeks later than Florida 80 and 'Gulf'. Jumbo is several days later flowering than Marshall except under warm winter conditions where many plants of Marshall may not be vernalized and remain vegetative indefinitely.

The principal use of Jumbo ryegrass for forage will be as a cool season pasture plant grown on both summer perennial grass pastures and prepared seed beds. The dairy farmers of Europe prefer the tetraploid ryegrass to diploid and the use of tetraploid ryegrasses is catching on with USA dairy farmers as well.

Jumbo ryegrass can be used for hay or silage, both when grown alone or in mixture with a legume. When grown with an early maturing red clover cultivar, such as 'Cherokee', or with 'Yuchi' or 'Amclo' arrowleaf clovers, it is possible to harvest two crops of ryegrass-clover hay or silage per season. However, the first crop must be harvested before March 1 in south Florida and before April 1 in north Florida. The second harvest will be in late April in south Florida and mid-May in north Florida. A single hay or silage cutting may be obtained at the end of the growing season from grazed pastures if grazing is stopped early enough to allow adequate time for regrowth of the ryegrass and clovers. Long term close grazing during the winter should be avoided if a spring hay crop is planned. Ryegrass in a mixture with crimson or rose clover usually will make only one cutting of forage containing a high percentage of the legume. Even then, grazing should cease by March 10 in north Florida if a good hay crop is desired.

Small grains are often planted in mixture with ryegrass, with or without clovers for pasture and hay or silage. The small grains give good early production and the ryegrass gives good late production resulting in a long productive season.

Establishment

Jumbo is easier established on a clean, firm seed bed. It can however, be successfully over seeded on summer perennial pasture, especially in North Florida. The best time to plant ryegrass is from mid-October to December when soil moisture is adequate for quick germination and growth of ryegrass. To seed ryegrass on an established perennial summer grass or perennial peanut sod, the perennial summer forage should be heavily grazed or closely mowed prior to seeding. Jumbo can be planted alone or in a mixture with small gains and/or various cool-season legumes. The recommended seeding rate of ryegrass is 20-35 pounds per acres (22-39 kg/ha) seeded alone and 10 to 15 pounds per acre (11 to 17 kg/ha) when seeded in combination with small grains and legume mixtures. The legumes can be grown with annual ryegrass include alfalfa; white, red, sub, Persian, rose, berseem and crimson clovers; sweetclover; and miscellaneous other legumes. Every southeastern cool-season pasture mixture, except those grown on extremely droughty soils, probably could benefit from the addition of some annual ryegrass seed. When ryegrass is grown in mixture with small grains, reduce the seeding rate of small grain to 2/3 of the normal rate when planted alone, and fertilize the mixture as recommended for the small grain.

Ryegrass establishes best when lightly covered with soil (up to 2/3 inch depth) and the soil is packed firm around the seed. However, much of the sod seeded ryegrass is broadcast with the fertilizer followed by drag scratching of the soil surface. When good rainfall occurs, any method which distributes the ryegrass seed and gets it in good contact with the soil will work. However, better seeding practices pay off in better and more dependable stands.

Forage Quality

The *in vitro* organic matter digestion and protein content of Jumbo are similar to other comparable annual ryegrass cultivars when grown under similar fertilizer levels and to similar maturity stages. The protein content of ryegrass is influenced greatly by nitrogen fertilization; protein level increases as the level of N fertilization increases. The digestibility and protein content of Jumbo, and other annual ryegrasses, decrease as the plant matures. The percent protein and *in vitro* organic matter digestibility of young vegetative ryegrass may be 20% and 80% respectively, and decrease to less than 10% and 65%, respectively with mature seed on the plant. The late boot or early flower stalk emergence stage is the optimum stage to harvest ryegrass hay for both high yield and high quality. The addition of legumes to ryegrass gives an even higher quality forage.

Haylage and silage made from Jumbo and other annual ryegrasses either grown alone with nitrogen fertilization, or grown mixed with cool-season legumes, can be of excellent quality

which compares favorably to haylage and silage from alfalfa and perennial peanut. Forage growers have often overlooked this valuable feed, probably due to the fact that, during the spring period, they needed the grass for grazing more than for hay. *Ryegrass or ryegrass-legume mixture makes an excellent winter crop to precede a summer crop such as soybeans or grain sorghum.*

Non-Farmland Use

Jumbo and other rust-resistant annual ryegrasses can be used in lawns and for ground cover in parks, recreational areas and highway right-of-way. However, Jumbo should only be planted where particularly robust growth is desired. Seeding rates for non-farm use are usually much higher (5 pounds per 1000 square feet [2.4 kg/10m²]) than for forage production. Non-cropland areas often are deficient in nitrogen which increases susceptibility of ryegrass to crown rust. Also, common ryegrass seed which is often rust-susceptible frequently is planted for non-cropland uses, because seed is less expensive. *These nonagricultural rust-susceptible ryegrass plantings often are the primary source of crown rust epiphytotics in ryegrass fields farther north.* Rust resistant ryegrass should be planted for both farm and non-farmland uses. Surrey and Jumbo should be seeded where late maturity is desirable; otherwise the earlier Florida 80 ryegrass is recommended.

Pest Resistance

Jumbo ryegrass has demonstrated excellent resistance to crown rust (Tables 2 and 3) among commercial cultivars evaluated and has some resistance to both gray leaf spot disease caused by *Piricularia grisea* and Helminthosporium leaf spot caused by *Drechslera* sp. It is normal to find a few rusted plants scattered through a stand of Jumbo ryegrass, especially after seed heads develop under low nitrogen and high rust spore conditions. In the Willamette Valley of Oregon, Jumbo has shown good resistance to stem rust (*Puccinia graminis* Pers.); therefore, good seed yields can be produced there.

Regardless of the ryegrass cultivar, cottony blight (*Pythium* sp.) disease can attack ryegrass seedlings causing severe stand losses when soil temperature is 70° or higher. The disease activity decreases as temperatures decline in the fall; thus early planting of ryegrass is not recommended. Jumbo was one of the most resistant ryegrass cultivars to gray leaf spot disease (*Piricularia grisea*) in the 1998-99 season outbreak (Table 4).

Mole crickets (*Scapteriscus* spp.) can damage ryegrass seedlings by tunneling and eating seed and/or roots. Fields where ryegrass is to be planted or is to be reseeded should be checked for mole crickets in summer and toxic baits applied if mole cricket populations are high.

Cold Damage

The cold resistance of Marshall was retained in Surrey. In the few trials where cold damage has been measured, Surrey was similar to slightly less cold tolerance than Marshall. This cold resistance of Surrey should carry over into Jumbo. The three seasons that Jumbo has been under test, the Southeast has not had cold conditions that would define its northern boundary of adaptation in the Southeast. Jumbo survived with little damage under 10° F in the Willamette Valley of OR and at 12°F at Ardmore, OK in 1998-99 seasons (Table 3). In 1998-99, Jumbo survived the winter at Madison, WS, producing both a fall and spring hay crop. In any case, Jumbo should be cold hardy to all of Florida and the southern portion of the Southeastern ryegrass belt and suitable for trial plantings further North.

Nitrogen Fertilization

Jumbo and other annual ryegrasses grow well only if adequate nitrogen is available in the soil. Because legumes growing with ryegrass often furnish little nitrogen to the grass early in the season, it is necessary to supply nitrogen to ryegrass during fall and early winter for early seedling establishment and maximum growth. On a seedbed prepared for ryegrass-legume mixtures, 40-60 pounds per acre (45-67 kg/ha) of nitrogen should be applied at seeding. This should be followed by a second application of 40-60 pounds per acre (45-67 kg/ha) in mid-December or after initial grazing.

Light grazing can be used to prevent early takeover of ryegrass clover mixtures by ryegrass. If grazing is not possible, apply nitrogen at seeding or seedling emergence only. If good legume growth occurs, no more than two applications of nitrogen should be necessary. When ryegrass alone is seeded, apply an additional 40-60 lb/A (45-67 kg/ha) of nitrogen in late February. Jumbo harvested for hay should receive 40-60 lbs/A of nitrogen twice before first harvest as suggested above. If there is a good stand of legumes in mixture with ryegrass, apply no nitrogen after the first harvest, but instead apply 40-60 lb/A (45-67 kg/ha) of potash (K_2O). When no legumes or a poor stand is present, apply 60-90 lb/A (67-101 kg/ha) of nitrogen and 40-60 lb/A (45-67 kg/ha) of potash (K_2O) immediately after the first harvest of hay or after grazing for a single spring hay crop. In some soils, application of phosphorus and micro nutrient fertilizer may be necessary.

Seed Production

Jumbo ryegrass has produced over 2400 lb/A (2670 kg/ha) of cleaned seed in Oregon. Seed can be produced in Florida also, but yields are much lower and seed harvesting and processing are problems in our humid climate. Seed size and seedling vigor from Florida produced seed are generally much less than for Oregon produced seed. Seed production in Florida is only recommended where reseeding is being attempted.

Weediness

Annual ryegrass seeds may germinate as volunteer plants and become weeds in small grains or other winter crops, and waste lands if allowed to produce seed. Jumbo and other annual ryegrasses all exhibit this potential to be a weed. The weed potential of ryegrass mainly is due to seed dormancy resulting when ryegrass seed is covered deeply in the soil and receives no light. On being returned to the surface by later cultivation, the seed will germinate. Most annual ryegrasses, including Jumbo, have this dark induced dormancy. Some ryegrasses also have after ripening and heat induced seed dormancy characteristics which protect or keep the seed from germinating during the summer following spring seed production. On pastures where ryegrass seeds are not covered deeply by soil, dark induced seed dormancy is not effective, so ryegrass seed must depend on after ripening and heat induced dormancies to survive the summer. Prevention of seed production for a single season will eliminate ryegrass with after ripening for heat induced dormancy from the pasture or field. For this reason, if one is to have a volunteer stand each season it is necessary for ryegrass to mature seed each season.

Herbicides that will control ryegrass in small grains and other crops are available. Close grazing and mowing or plowing ryegrass to prevent seed production allows all annual ryegrass to be grown on any land without being a weed problem.

Seed Suppliers

Seed classes of Jumbo are breeder, foundation, registered, and certified. Breeder seed will be maintained by the University of Florida, IFAS, Agronomy Department. Application for Plant Variety Protection will be made for Jumbo. Florida Foundation Seed Producers Inc., Greenwood, FL is responsible for increasing seed of Jumbo. Smith Seed Services, Inc. of Halsey, OR has been given exclusive right to market and produce seed of Jumbo.

Acknowledgments

We are indebted to the many researchers in the Agricultural Experiment Stations of Oklahoma, North Carolina, Texas, Louisiana, Mississippi, Alabama and Georgia who included and evaluated Jumbo in their annual ryegrass trials. We have included data from their various annual reports in this circular. Special appreciation is given to the ryegrass cooperators in the above states who accepted our seed and redistributed it for use at other locations within each state and helped prepare the annual ryegrass report for their state. These cooperators were: Dr. Jerry Baker, Samuel Roberts Noble Foundation, Arkmore, OK; J. Paul Mueller, North Carolina State University, Raleigh, NC; L. R. Nelson, Texas A&M Agricultural Extension Center, Overton, TX; Brad Venuto, Department of Agronomy, Louisiana State University, Baton Rouge, LA; Ned C. Edwards, Jr., Southern Branch Experiment Station, Poplarville, MS; Kathryn M. Glass, Department of Agronomy and Soils, Auburn University, Auburn, AL; and J. La Don Day, Department of Agronomy, Georgia Experiment Station, Experiment, GA.

We are greatly indebted to Reed E. Barker of USDA-ARS National Forage Seed Production Center of Corvallis, OR for stem rust and seed production selection in diploid population. We are particularly indebted to Dr. W. F. Furenstein and Deutsche Saatveredelung, DSV, Germany for doubling the seed of the diploid ryegrass population which made possible Jumbo.

Table 1. Average seasonal dry matter forage yields of five ryegrass cultivars at various southeastern USA locations over three seasons 1996-97 to 1998-99.

Location	Selected Ryegrass Cultivars				
	Jumbo	Surrey	Rio	TAM 90	Jackson
Average seasonal dry matter forage yield (Lb/A)					
Jay, FL	4770	6130	5300	----	4800 (2)
Gainesville, FL	6370	4950	4890 (2)	4820	6030
Ona, FL	5560 (2)*	4640 (2)	4760 (2)	----	4960 (2)
Quincy, FL	8280	8580	8740 (2)	----	8340 (1)
Tifton, GA	8820	8450	8590	8150	8940
Plains, GA	7260	7160	7010	7080	6530
Griffin, GA	11660	11280	12600	11840	11570
Tallahassee, AL	5250	5160	5360	4980	5240
Crossville, AL	3470	3800	3820	3720	3820
Fairhope, AL	7630	7910	8500	8290	7970
LA, 1996-97**	8950	9000	8850	8730	8810
LA, 1997-98**	8480	8660	8310	8550	8700
LA, 1998-99**	7610	6900	6750	6130	7270
Popularville, MS	7010 (2)	6080 (2)	5630 (2)	5830 (2)	5830 (2)
Raymond, MS	6920	7140	6690	7290	7210
Newton, MS	6230	6480	6410	5880	6180
Beaumont, TX	6200	5320	5150	5110	5490
Overton, TX	6000	6550	6260	6870	6060
Ardmore, OK	7920 (2)	7410 (2)	7770 (2)	7680 (2)	----
* Number in parenthesis show number of years averaged for value in Table when grown less than 3 growing seasons.					
** Average over 5 to 7 locations in each season in Louisiana.					

Table 2. Crown rust index and annual rust index values of selected annual ryegrass entries at Gainesville, FL during the 1996-97 to 1998-99 growing seasons.

Ryegrass cultivar	Annual rust index values at 90% heading or selected dates in seasons			Crown Rust Index*	
	1996-97§	1997-98§	1998-99§	1999	Years rated
Gulf	3.9	4.1	5.8	3.13	(9)
Marshall	8.9	8.9	7.8	8.12	(10)
Stampede	(1.9)¶	1.9	4.2	2.40	(4)
Jackson	2.7	2.2	3.1	2.49	(10)
Surrey	2.5	2.3	2.9	2.37	(10)
Jumbo	(1.8)	(1.4)	(1.7)	1.63	(3)
Florida 80	2.4	2.6	3.3	2.25	(10)
TAM 90	4.8	4.7	6.1	3.57	(10)
Rio	2.6	1.7	2.8	2.63	(9)
Florlina	(2.3)	(2.4)	(2.5)	2.40	(3)
Number of replications in nursery	4	2	3	----	----

Experimental ryegrass entries for only a single year or withdrawn from continuation to cultivar release were omitted. Several multiple entries per year of the same genotype were averaged to a single entry. Ratings prior to 1996-97 season are not shown.

§ Rust index values were mean of ratings made March 8 and 13 in 1997, mean of ratings made April 15 and 21 in 1998 and mean of ratings made April 14 and 19 on regrowth after March 1 in 1999.

¶ Parentheses () indicates that this was an experimental germplasm prior to its naming as cultivar.

* Rust index of 0-3 is highly resistant, 3-5 is resistant, 5-7 susceptible and above 7 highly susceptible to crown rust.

Table 3. Miscellaneous disease and cold ratings for selected ryegrass cultivars in southeastern USA.

Ryegrass Cultivars	Crown Rust			Cold Injury
	Ona, FL 9 May 1997 % coverage	Jay, FL 12 May 1997 rust rating*	Beamont, TX 1996-97 % coverage	Ardmore, OK 1998-99 rating**
Jumbo	0.8	0.0	3	4.0
Surrey	4.5	1.0	8	4.5
Marshall	78.3	----	48	4.0
Gulf	1.0	4.0	6	----
Big Daddy	4.7	1.3	4	2.5
FL 80	2.8	1.0	----	----
Passerel	----	7.0	----	3.7
Rio	----	1.0	10	3.5
TAM 90	----	----	15	2.0
Jackson	5.2	1.0	5	----

* Rust Rating = 0 = none to 10 = complete coverage.

** Cold injury rating (1-5 scale) 1 = 80% of more leaf loss and more than 50% stand loss; 5 = less than 10% leaf loss and no stand loss.

Table 4. Gray leaf spot disease (*Piricularia greasa*) ratings on selected ryegrasses at Quincy and Green Acres Farm and Dairy Research Unit (DRU) at Gainesville during 1998-99 season.

Ryegrass Cultivar	Gray Leaf Spot Ratings†			
	Quincy	Green Acres	DRU	
	April 23	March 1	March 26	April 8
Jumbo	3.3	2.3	4.5	3.8
Surrey	7.1	3.5	4.3	6.7
Florlina	5.8	3.7	3.7	4.2
Florida 80	8.2	4.5	4.8	5.5
Rio	5.6	4.7	4.8	5.7
Gulf	----	5.2	4.3	5.8
Stampede	6.5	3.2	6.2	5.8
Jackson	----	3.7	4.5	3.0
Marshall	4.8	4.2	5.0	6.0
TAM 90	----	3.5	5.7	6.5
Big Daddy	7.4	2.5	4.7	4.2
̄ of Reps	4	3	3	3
† Gray leaf spot ratings: 0=none to 10 entire plant covered with spots and chlorotic and dead tissue.				

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICEEXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) Florida Agricultural Experiment Station	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER FL X1997 (G) 4X LR	3. VARIETY NAME Jumbo
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 1022 McCarty Hall P.O. Box 110200 Gainesville, FL 32611-0200	5. TELEPHONE (include area code) (352) 392-1784	6. FAX (include area code) (352) 392-4965
7. PVPO NUMBER 200000196		
8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Jumbo tetraploid annual ryegrass was developed by Professor of Agronomy and Ryegrass Breeder, Gordon M. Prine as a part of his employment by IFAS.		
9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
10. Is the applicant the original owner? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, please answer the following: a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)? <input type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country _____ b. If original rights to variety were owned by a company, is the original owner(s) a U.S. based company? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country _____		
11. Additional explanation on ownership (If needed, use reverse for extra space): Jumbo was licensed to Smith Seed Services, P.O. Box 288, Halsey, OR 97348, to exclusively produce and market seed in return for royalties to Florida Foundation Seed Producers. A non-profit organization that serves IFAS.		

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-5881 (voice) or (202) 720-7808 (TDD). To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.